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RCA 103 LOUDSPEAKER

SOUTHERN CALIFORNIA ANTIQUE RADIO SOCIETY

Incorporated, Non-profit Organization

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SCARS is a non-profit organization. Its purpose is to preserve the history of wireless communication by encouraging the acquisition, preservation and exhibition of antique wireless and radio apparatus and publications pertaining to its history and development.

SCARS promotes social contacts through meetings held four times a year at various locations in Southern California. Featured at these meetings are contests, swap sessions and talks by members and guests on subjects of interest to collectors.

The club publishes quarterly the *California Antique Radio Gazette* which features news of club activities, hints on restoration, and advertisement of radio related items available for sale or trade. It is furnished free to all members. Ads are printed free for members. SCARS assumes no responsibility for the condition of items sold at swap meets or through *Gazette* ads.

Membership is open to anyone having a genuine interest in preserving equipment and history of early wireless and radio equipment. Dues are $10.00 per calendar year.

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The opinions expressed in the *Gazette* are those of the authors and may not reflect the opinions of the editors or the SCARS membership.

NOV. 16 & 17 MEETING
Saddleback Inn
12500 E. Firestone Blvd.
Norwalk, Calif.
(See detail schedule
on enclosed flier)

ANNUAL DUES

The *Gazette* and your membership are on a calendar year basis. This November *Gazette* is the last issue for 1990. To receive the next issue, and to pay dues for 1991, please send $10 ($11 for member and spouse), check made out to SCARS, to Dan Mason, new membership person, 1325 N. Lima Street, Burbank, CA. 91505.

GAZETTE DEADLINES

All ads, material and articles for SCARS *Gazette*:

February issue . . . . .December 1
May issue . . . . . March 1
August issue . . . . . .June 1
November issue . . . .September 1

MEMBERSHIP DUES

Effective immediately, send all new and renewal dues payments to:

Dan Mason
1325 N. Lima St.
Burbank, CA 91505

PRESIDENT'S MESSAGE

There's a new piece of equipment showing up at the SCARS swap-meets; flashlights! At the August meet there were quite a few early bird sellers and buyers busy by 6 a.m. It was still pretty dark so the flashlight was the key to any business that was transacted. With the scarcity of interesting older pieces, more and more club members want to get the jump on the rest of the crowd but they still want to see what they're buying!

The scheduled speaker did not show up but Morgan McMahon gave a great impromptu talk about transistors; how they're made, and how they work. Morgan has a knack of making technical details understandable to those who may not be as technically oriented as others.

"Happy Wanderers," Walt and Mary Curry were back in town for the meet. It was good to see them and hear about their travels. For details, see the article written by Walt for this issue of the *Gazette.*

It was announced during the business meeting that Dan Mason will assume Membership Secretary duties, effective immediately. I appointed Dan to fill the position for the remainder of the year. He will be voted in by the membership at the annual meeting in November.

From comments we heard at the August meet, everyone is looking forward to the two-day November meet in Norwalk. Member turn-out should be even better that it was last year. See you there!

Chuck Strozier
President

NOTICE

Only SCARS members may sell at SCARS meets.

THE RCA LOUDSPEAKER 103

by Kenneth Ericksen

Selling at $37.50 in 1928, the RCA Loudspeaker 103, in its day, marked a distinct advance in loudspeaker design. The beautifully modeled octagon frame, with its roses and vase tapestry grille inclosure, was a radical departure from the conventional loudspeakers of the day.

As the pioneer in every marked improvement to broadcast reception in the home, it is fitting that the Radio Corporation of America, some sixty-five years ago, created a loudspeaker which not only was an exceptional reproducer, but also was an ornamental masterpiece. The artistic appearance of the loudspeaker was then, as it is today, as completely satisfying to the eye as its superb performance was to the ear.

Every resemblance of a mechanical device was effectively eliminated from the encasement by its designers. The wooden frame and pedestal are molded to resemble hand-carved oak. Although exceptionally rigid, comparatively light in weight, its molded frame is many times stronger than one actually carved out of wood and it is not susceptible to variations in temperature or moisture which might crack or warp an ordinary wood frame. A beautiful tapestry medallion conceals the mechanism of the loudspeaker. The use of a soft felt pad which is fastened to the bottom of the pedestal prevents the possibility of marring or scratching any highly polished surface on which the loudspeaker may be placed. These facts strongly appealed at once to those who were considerate of their home furnishing, allowing the loudspeaker to become very popular throughout America and foreign countries.

The RCA-103 loudspeaker consists essentially of a molded frame with a tapestry grille, a baffle board, cone support, cone, motor mechanism and filter unit. A fiber canopy is provided to cover the entire rear mechanism and a silk cover is tied over this canopy to add to its artistic finish and still provide easy access to the mechanism when necessary.

Reproduction by the RCA-103 loudspeaker is unusually clear and distinct. Voice is clean-cut and natural, and musical notes are reproduced with remarkable fidelity. Although it is very sensitive, it will handle substantial volume without overloading.

The loudspeaker was an improved design of the extensively used RCA-100A loudspeaker, and it is especially apparent that when used with a RCA superheterodyne broadcast receiver such as the Radiola 60 that it provides particularly fine quality of reproduction. The maximum capabilities of the loudspeaker are obtained when it is connected to a radio receiver, or an amplifier unit, in which power-amplifier Radiotrons UX-120, UX-112-A or UX-171-A are used in the last audio stage.

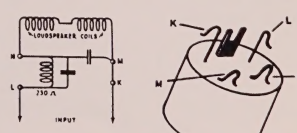

Figure 1 —Schematic circuit of Loudspeaker 103 coils and filter and photo of filter unit

To prevent mechanism damage, some method of coupling the output of the receiver to the loudspeaker should be employed when the loudspeaker is used in conjunction with receivers using output tubes passing

current in excess of ten milliamperes through the loudspeaker windings. Although RCA provided a 1 to 1 ratio coupling transformer especially designed for this purpose during the late 1920's, a choke and condenser arrangement will also give satisfactory results for this purpose when properly connected. This effectively bypasses the plate current so that it does not pass through the loudspeaker. Such a device is absolutely necessary with Radiotron UX-171-A or with other power tubes when, as previously noted, the plate current exceeds ten milliamperes. With Radiotrons UX-112-A and UX-120, an output device is desirable though not absolutely necessary. Some receivers, such as Radiolas 17 and 18, are equipped with output devices. Figures 2 and 3 show the correct values and connections of either a transformer, or choke and condenser to the loudspeaker.

SERVICING THE LOUDSPEAKER

Common service problems related to the loudspeaker range from weak reproduction to distortion, noise and rattle. These conditions and their attending causes, while not limited to the 103 loudspeaker, still warrant discussion.

1. RECEIVER OUTPUT. Before inspecting the loudspeaker for imperfect reproduction, check the receiver output with headphones. Any distortion in the receiver will be faithfully reproduced in the loudspeaker. If a signal of good quality and volume is being delivered by the receiver, the loudspeaker must be examined for the cause of any imperfect reproduction that may occur. This can easily be accomplished by removing the silk cover and fiber canopy to expose the mechanism of the loudspeaker.

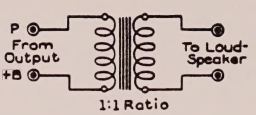

Fig. 2. Loudspeaker Coupling Transformer Method

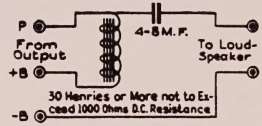

Fig. 3. Loudspeaker Coupling Choke and Condenser Method

2. FOREIGN MATERIAL INTERFERING WITH ARMATURE ACTION. An inspection of the armature will generally disclose any foreign matter interfering with the armature action, resulting in poor reproduction. A small piece of heavy paper or a piece of copper or brass, not over .010 thick, may be used between the armature and pole pieces to remove dirt, dust, or other interfering substance.

3. ARMATURE STRIKING POLE PIECES. Distortion and rattle may be caused by the armature striking either or both of the pole pieces. This is generally determined by inspection, however in some cases the contact may be so slight that it appears not necessary to adjust the armature. In any case an adjustment of the armature should be done. Adjustment of the armature is best accomplished by the use of two phosphor bronze strips .010 inch thick and .25 inch wide, tapering to a width of .15 inch at their extremities. One tool is placed in the space between the armature and pole piece of the motor mechanism at the end next to the filter unit. The other tool is placed at the end of the armature

to one side in order to clear the drive pin located at the end of the armature. By loosening the two armature mounting screws, any tension in either direction, that may have been on the armature is released. Before removing the spacer tools apply a hot soldering iron to the drive pin thrust lever connection and heat the solder sufficiently to allow the drive pin to find its normal position with regard to the thrust lever. The iron is then removed, mounting screws are tightened and the spacer tools removed. This adjustment correctly aligns and balances the armature so that no abnormal strain is imposed upon it in any direction.

4. FILTER UNIT AND MAGNET COIL TEST. A defective filter unit or a filter unit not properly connected in the circuit will cause distortion. A defective magnet coil will also cause imperfect reproduction. The circuit diagram and correct connections are shown in Figure 1. The reference letters in the circuit diagram refer to the filter unit itself. A simple VOM continuity test will indicate if an electrical defect either in the coil or the filter unit exists (See Figure 4). A short across the coil can be determined by checking its resistance. The correct resistance for this coil is 230 ohms. The magnet coils may be checked for an open by testing from one lead to the other. An open indicates a defective coil which will require replacement before the loudspeaker can become operational.

5. LOUDSPEAKER CORD AND CONNECTIONS. A defective connection, either in loudspeaker cord or coil connections may cause distortion, noisy or no reproduction. As there is not much wear and tear on the coil connections, the most likely place to find trouble of this nature is in the connecting cord. The point where the cord enters the loudspeaker housing and the ends on which the pin terminals are located may become frayed and worn, causing a possible short or open circuit. If these points prove OK, and there are no indications of any defects external to the speaker housing, the cover should be removed and the lugs of the cord soldered to the filter unit examined. If there is no apparent defect the cord should be disconnected and tested by means of a VOM. Its leads should be tested for end-to-end continuity and also for a short between the leads. Shake the cord while conducting the continuity test to disclose any break which will be indicated by the meter reading.

6. REAR SILK COVER. This cover should not be removed permanently since its purpose is to prevent accumulation of dirt and dust in the speaker mechanism. The draw cords on the silk cover may be made inconspicuous by placing them inside of the opening, but should be placed in a position such as not to interfere with the vibrating mechanism of the loudspeaker.

FILTER UNIT CONTINUITY TESTS

Remove all connections and refer to Figure 1

Test	*Correct Effect*	*Incorrect Effect Caused By*
N to M	Open	Shorted Condenser
N to L	Closed	Open Coil

Figure 4

Manufacturing the Tapestry Grille Cloth in the 1980's

The first time I looked upon a 103 loudspeaker was during a SCARS meet in 1982. It was the sorriest loudspeaker I had ever laid eyes upon. The tapestry grille cloth, including the rear silk cover was in rags, it leaned backward on its pedestal, and its original finish had long since disappeared. From that time on I decided to dedicate my efforts in SCARS toward doing something for that loudspeaker.

Not long afterwards I met another member, Harry Grossman, who willingly gave me the rare tapestry grille cloth from his loudspeaker to experiment with. Not many people would do that even today, and for this I hold great respect for him. That same year my wife Evelyn and I carried the grille cloth to the Peoples Republic of China where we met with Mr. Chen Wen-Shuen and his associate, Mrs. Xia Zhil-Lin, in an effort to determine the feasibility of reproducing the cloth which had been manufactured some fifty-six years earlier. Many hurdles had to be overcome such as determining the type of weave and pattern, loom requirements, thread color and our ability to meet or exceed the original RCA specifications.

By 1986 after experiencing numerous failures and near look alikes, we were able to recreate a grille cloth that appeared to meet all of RCA's original specifications. For this effort, I hold both Chen Wen-Shuen and Xia Zhil-Lin in the highest esteem possible, for without their technical efforts the limited amounts of new grille cloth in existence today could never have been achieved.

RESTORATION

This loudspeaker frame and base can be beautifully restored with a little patience. Restoration is best accomplished by the use of a good stripping agent, a stiff brush, and the use of lacquer thinner to wash away any stripping residue left. Since the frame is of a wood fiber composite, allow it to dry for approximately three weeks before applying a stain. The frame will accept only an oil base stain (a dark walnut color is recommended) and is best applied by using a soft brush and brushing until no dark patches or streaks appear. Two to three coats are required, allowing a drying time between each of about four weeks.

Should the loudspeaker exhibit any cracks, fill smooth with a plastic putty before staining. If the loudspeaker has a severe backward tilt on its pedestal, sand the base with a belt sander at an angle just enough to correct the lean. If a light sanding isn't going to be adequate to correct all of the lean, then very carefully pry the octagon frame away from the pedistal base (they are held together by a metal screw and two wood dowels) and sand each for correction. Last but not least, upon completing the restoration, be sure to put a new piece of felt cloth on the pedestal base and never allow anyone to lift the loudspeaker by the top of its octagon frame.

REMINDER

Pay dues for next year. Send November registration and meal reservation money to Murrel Crump, 1633 Buena Vista Dr., Palm Springs, CA 92262. Make reservations at the Saddleback Motel.

Remember: Do these three things.

"MATCHING" POWER OUTPUT TUBES

By Ed Sheldon

PART 1

It was my intention to write an article about how to make a series of simple measurements on loud speakers and output transformers. The purpose of these measurements would be to determine the suitability of unmarked speakers and output transformers to "match" the output tube(s) of the set which is being restored. At this point I could see that there was a great deal of confusion over what "matching" an output tube really means.(Matching is sometimes called the optimum load which is a much better term, but matching has gotten into the vernacular, so be it.) A background article to bring the reader up on the curve is needed and so here goes.

Conventional wisdom says that in radio circuits you usually match the generator (an output tube) to the load (output transformer and/or speaker combination). Fact! This is almost never done because there are usually other overiding considerations such as distortion or efficiency. In the case of r.f. circuits selectivity may be the most important . In the case of antenna circuits independence from antenna tuning affects may be very important. As you may remember it was the antenna effect that held up the introduction of single dial tuning for several years. To put it another way the antenna tuning condenser does not track with the other two dials on a three dialer. The fix was to decouple the antenna primary coil and to tune it above the broadcast band or somewhere around 450-500 kc higher.

In the period up to 1933 the triode output tube was the only game in town. First there was the 12A followed by the 71A, 45 and 2A3. Triode output stages were noted for their good clean sound. True they had a lot of second harmonic distortion but that could be reduced by push pull operation. It also turns out that the human ear does not seem to mind some second harmonic distortion. The third harmonic, however, is very bothersome to most people. What does this have to do with impedance matching? Let us take the 2A3 as an example. The plate resistance is 800 ohms and the recommended load is 2500 ohms. This is not exactly matched, is it? However analysis and experiment have shown this to be the conditions under which a 2A3 gives the highest output for the least (objectional) distortion. Note that the load is about three times the plate resistance of the 2A3. Two or three times the plate resistance is typical for triodes. What about pentodes and beam power tubes? By 1933 we had the 47 then the 42, 2A5 and many other pentode output tubes. The pentode quickly became the preferred tube type for power output stages. It was more efficient than the triode and had higher power sensitivity (more watts per volts of input).

Then in 1936 the beam power tube was introduced. I can remember the first time I heard one in a General Electric console. How we marvelled at all that power from a single output tube. It was 6.5 to 10 watts depending on operating conditions and how well you tolerated distortion. As you know the 6L6 is a tetrode which has pentode-like characteristics due to the beam forming plates used in its construction (See

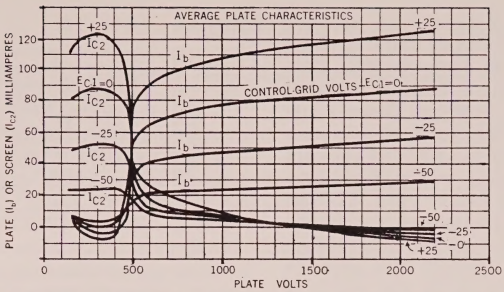

Fig. 1 —Typical plate characteristics of a type 860 tetrode. These curves correspond to those of a triode but shape is modified by the extra screen-grid. Screen-grid voltage determines value of plate voltage at which current rises rapidly. Screen voltage is 500 volts for above curves.

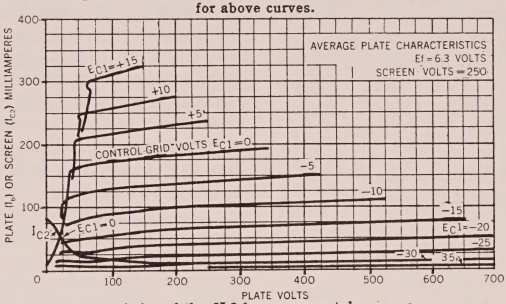

Fig. 2 —Plate characteristics of the 6L6 beam power tube Tube has characteristics of pentode but not disadvantages of electron emission from the overheated suppressor grid when latter is used in power circuits.

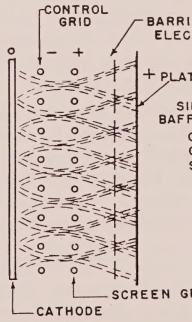

Fig. 3a—Operating action of a tetrode is improved by the proper alignment of the control and screen grids. Converging streams of electrons form dense negative charge to simulate a suppressor.

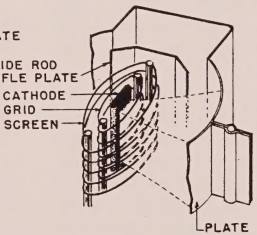

Fig. 3b—Cut-away view of a 6L6 beam tetrode showing location of elements that simulate the action of a suppressor grid, giving a tetrode the characteristics of a pentode.

figure 3). The beam forming plates suppress the kink in the plate characteristic curves which is typical of a tetrode. Compare, Figure 1 and Figure 2. This kink occurs in a tetrode when the plate voltage dips below the screen voltage. Some have called these beam tubes kinkless tetrodes for this reason. You should also note how low the plate voltage can drop in the 6L6 (See figure 2) before the knee of the curve is reached. This is one of the secrets of the high output of this type of tube.

At this point it would be convenient to show an equivalent circuit of a 6L6 and its load because the 6L6 or any pentode can be most conveniently analyzed as a current generator. But, I don't want to lose you so let's look up the 6L6 in a tube manual. We find that the 6L6 has a plate resistance of 22,500 ohms and that the recommended load is 2,500 ohms. Now let us look at figure 4, power output and distortion curves for a 6L6 beam power "pentode." Couldn't we get more power output with a higher load impedance? You bet, but look at what happens to the third harmonic. You should also note that if we pick 4,000 ohms for a load the second harmonic goes way down. However, for this load the third harmonic goes way up.

Some of you may have noted that up to this point I have not mentioned negative feedback which some have called the most important development next to the vacuum tube (and the transistor) of the 20th century. Negative feed back was invented by Harold S. Black while he was working on telephone amplifiers at the Bell Telephone Laboratories. His famous paper on *Stabilized Feedback* Amplifiers was released for publication in December 1938 by the AIEE.

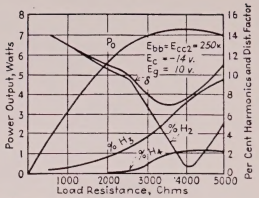

FIG. 4 Power output and distortion curves for the type 6L6 beam power pentode in Class A1 operation.

Black received a patent for this invention in 1937. Negative feedback therefore was not generally known nor was it in general use in radios until around 1939. Black's invention drastically improved audio amplifiers and made real hi-fi possible even with pentodes and beam power tubes but that is another (long) story.

Although I have only been able to hit the high spots, my purpose has been to stimulate your interest in the development going on in audio during the 1930's. I also have tried to point out the best match of a tube to its load is not done by some sacred law of physics, but that it is a somewhat inexact process with various subjective elements involved in it (trade-offs between the second and third harmonics).

If you wish to do more reading on this subject I recommend, "*The Electronic Engineering Handbook*" by Batcher and Morelic as well as "*Theory and Application of Electronic Tubes*" by H. J. Reich.

Announcement: Please remind all other club members you know to renew their subscription for 1991. Non-renewed members will not be receiving next *Gazette*.

AT THE LANSING AND ELGIN MEETS

or

On the Road with Walt and Mary

by Walt Curry

Mary and I decided to combine a canoeing trip to Michigan and Wisconsin with attending the Lansing and Elgin meets. On the way we stopped in Nebraska at the farm of a wholesale antique dealer who maintains several barns and sheds full of good junk including "as found" radios obtained at estate auctions. The main feature of these "barnyard specials" is that no one has fooled with or "restored" them in the last 50 to 60 years. A mouse had climbed in an AK 20C and chewed up an original owners' manual to make a nest.

SCARS members at the Lansing meet included the Currys, the Rasadas and Leonard Urlik. Although we counted only about fifty sellers there was enough stuff around to make a worthwhile swap meet and a fairly large main auction. There was an excellent Sparton display, highlighted by Doug Heimstead's blue glass "Nocturne" floor model. A nice contest completed a well run meet by MARC and Jim Clark.

The ARCI meet at Elgin is second in size only to the annual AWA meet. Several SCARS members were there including the Currys, the Rasadas, Joe Knight, Stu Oliver, Jack Weatherby, Leonard Cartwright and Bill Condon. The swap meet was large, with plenty of buying opportunities. "Good deals" were quickly snapped up by a continuous stream of hungrily circling buyers. A Regency TR-1 went for $10. There was a nice advertizing display and contest. At the auction, one of the few good pieces actually sold was a DeForest MT-200 Interpanel tuner unit that went for $425, with no tag on the cabinet.

Although the auctions at both meetings had some choice pieces entered, they rarely sold because of unrealistically high reserve levels, especially on catalin and art deco items. The reserve levels were never disclosed and owners were allowed to bid the price up. A lot of time was wasted in useless bidding, and some items at Elgin which appeared to sell were actually "bought" by the owner at prices lower than the reserves. These "buy-backs" cost the owners only a 2% "appraisal fee." I think the AWA auction handles high reserve items more efficiently by quickly letting the audience know what the reserve level is if bidding is far short of the mark.

Neither meet had very many older, pre-1930 items but newer plastics and transistor radios along with Zenith consoles were plentiful. Clearly the definition of "antique radio" is changing. Some of the cheaper plastic and transistor sets from the 50's and 60's were selling for more than 1920's battery sets. Any time a catalin or "art-deco"item appeared dealers would immediately pounce on it and then put it out on their own tables for $200 more. We concluded the market is being increasingly driven by younger collectors. Nostalgia and artiness outweigh considerations of scarcity and antiquity.

Actually the best deal I found on our trip was in a little antique shop tucked away in northern Michigan.

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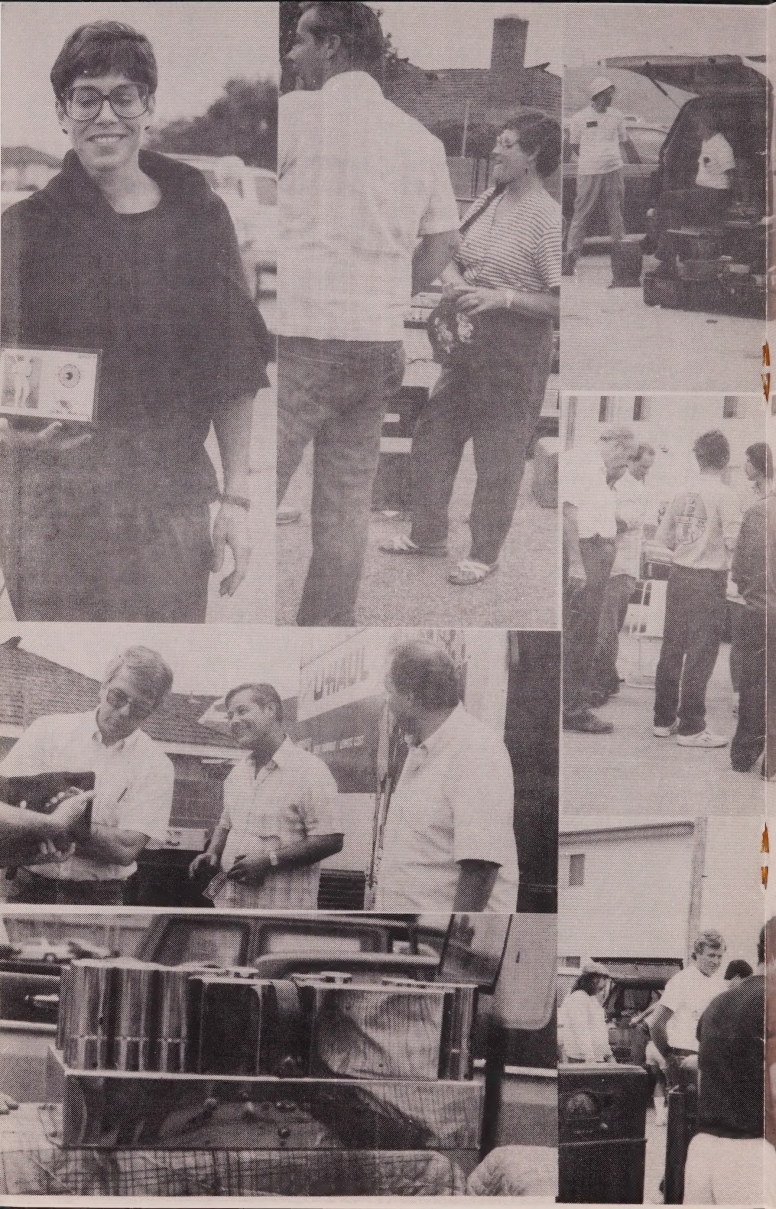
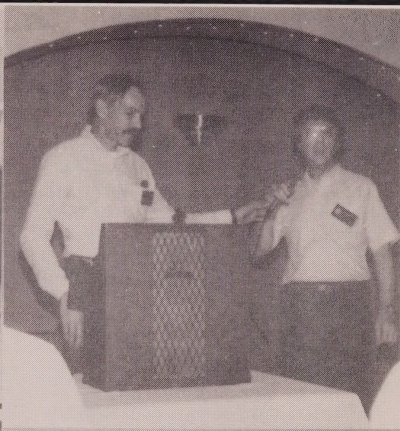
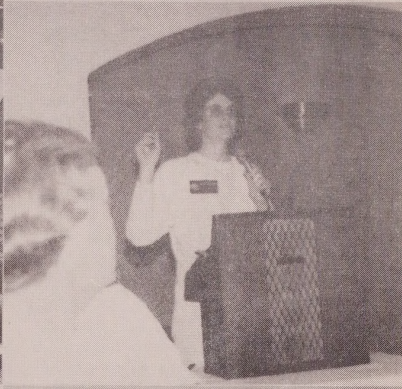
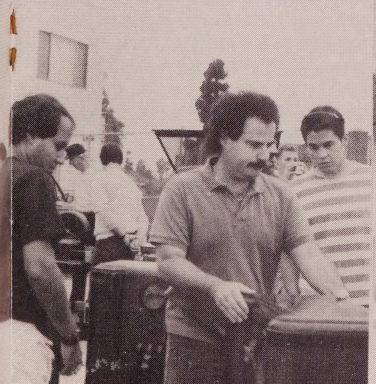
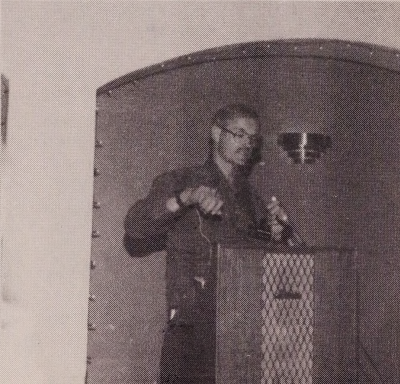










When the Grebe CR-13 First Introduced Short Waves to the Amateur Community

by Robert E. Grinder, K7AK

Pressing military demands during WWI stimulated the development of vacuum tubes, but when amateurs returned to the air in 1919, their mind-set was still in the spark era. Amateurs and radio engineers alike believed then that radio efficiency improved at longer wavelengths. They regarded shorter wavelengths as useless. Although the Radio Act of 1912 limited amateurs to one transmitting frequency — 200 meters, they had operated routinely during prewar years from 200 to as high as 600 meters, taking care to avoid ships at sea and other commercial services.

Two disquieting circumstances disrupted the postwar complacency. One the one hand, amateurs were obliged to abide by the law when the new phenomena of broadcasting encountered severe interference from their transmissions. On the other, amateurs were forced to consider wavelengths below 200 meters as a means of escaping interference from one another. A spark transmitter, for example, always blotted out huge segments of the radio spectrum, depending on its distance away from the receiving apparatus.

Efforts to resolve the interference mess led amateurs to the continuous wave transmitter (c.w.), a product of tube technology. Amateurs found that via c.w. they could transmit farther with less power, and, significantly, with less than one percent of the bandwidth of a spark transmitter. Most amateurs at the time used motor-generators as power supplies, which put raw a.c. on the plates of transmitting tubes, and a nice 60-cycle note on signals, which, in turn, enabled them to be copied by non-oscillating detectors.

C.W. adherents faced problems less of signal quality than of signal stability. Oscillator-amplifiers, which isolated oacillators from antenna vagaries were yet to be invented; consequently, when wind or whatever led to movement in the transmitting antenna, the wavelength of the transmitted signal was affected.

Stability was particularly acute in respect to receiver tuning. Amateurs in the immediate postwar years used a one tube, regenerative set having variometers in the grid and plate circuits. The variometers worked well when receiving spark, but were hopelessly inadequate for c.w. reception. Antenna motion notwithstanding, hand movement also affected tuned circuits via body capacity. Operators had to become practically immobile and cease breathing to hold a signal in resonance.

The severity of the stability problem led many amateurs to question whether c.w. transmitters and receivers could ever be made sufficiently stable to permit two-way contacts at a wavelength as short as even 200 meters. Nevertheless, the long-range advantages of c.w. over spark were apparent and questions about short-wave activity were coming into focus. For example, why do signals jump over near stations to reappear at a greater distance? How do seasons effect short-wave transmissions? What is the relationship between fading and reliable communications? Why do conditions change between night and day?[1]

Amateurs thus persevered in attempting to understand short waves. A few amateur stations in 1921-22 were licensed to experiment on 175 and 180 meters, and at a national radio conference in 1923, the U.S. Government permitted all amateurs to operate on wavelengths between 150 and 200 meters, and some stations, with special permission, to work as low as 100 meters.

The amateur community, however, was stymied. Members could construct c.w. transmitters that would function at 100 meters, but no one knew how to build a receiver that would work satisfactorily at such a low wavelength. As one amateur lamented, "Is there not some manufacturer (sic) who will produce a tuner,..... whose normal range is from 100 to 200 meters...? Certain stations to our knowledge have done excellent work on waves as low as 150 meters... but... all these stations have abandoned the short wave..... because no one else could tune down to them..... No one within their range had been able to buy a tuner that was made for amateur wavelengths."[2]

The basic difficulty was grid-plate capacity, too much of which sent a tube into oscillation and unstabilized the receiving circuit. One stabilizing method then known to the amateur world was that of increasing the positive bias on the grid, and thereby, desensitizing r.f. amplification. Whether using a detector tube alone or r.f. amplifier/detector tubes in cascade, the problem seemed irresolvable.

In 1923 the A.H. Grebe Company introduced the CR-13, a receiver designed especially for amateur short-wave operation. Grebe had adapted the well-known variometric configuration to achieve an effective short-wave receiver that transcended expectations of the day. The CR-13 tuned from 300 meters (1000 kHz.) all the way down to 80 meters (3,750 kHz.). The receiver included a single stage of tuned radio-frequency amplification feeding a detector. The design reduced antenna effects by coupling it loosely to the r.f. amplifier variometer and by providing an adjustable rheostat to control the propensity of the amplifier to oscillate. Further, the plate inductance of the detector tube was also loosely coupled to the detector circuit and was not tuned to incoming signals.

Advertising statements in the November, 1923, issue of *QST* depict the major features of the CR-13 and indicate the extent to which the Grebe company believed that it had resolved the problems of short-wave reception: the receiver is designed with the "relay man" in mind; the tuning dial for the detector variometer is graduated in wavelengths, which enables an operator to locate instantly a desired station (an unheard of feature in 1923); special resistance units, cut in and out by miniature push-pull switches, permit use in the CR-13 of tubes of any filament voltage; and finally, the "much-sought-for development" of a "perfect combination" of regeneration and tuned-radio-frequency amplification yields "sharper tuning, greater distance, greater signal strength and less QRM."

During the summer of 1923, a French amateur, 8AB, Leon Deloy, visited the United States to schedule an attempt to make the first two-way transatlantic contact. One-hundred meters was selected as the operating frequency; Deloy purchased a CR-13 and returned with it to France. Fred

(Cont. on B.C.)

AMPLION HORN SPEAKERS

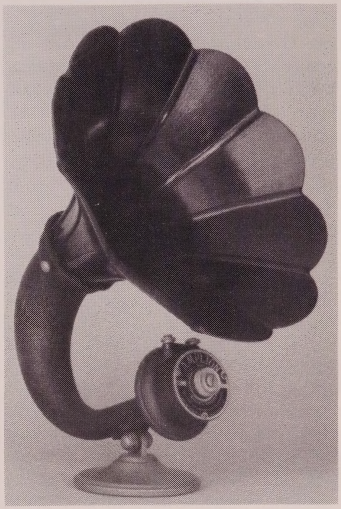
By Floyd Paul

Amplion, An English-made horn speaker had a long period of success in England. Loud speaker sales began in 1887 according to many ads run in U.S. magazines. The British Admiralty bought many loud speaking systems for naval ships during the early 1900's.

By 1923 Amplion radio horn speakers were introduced into the U. S. market. The first American agent for Amplions was the Signal Electric and Manufacturing Company. Apparently sales were brisk and the English Company, under Alfred Graham (inventor and owner) set up an American company called "The Amplion Corporation of America (ACA)" in August of 1924 to handle imported horns. By 1925 more Amplion companies were formed in Canada, as well as Belgium, Paris, France, and Australia.

In February of 1925 the ACA office at 280 Madison Ave., New York City, expanded and a manufacturing and assembly department was established at 52 Warren St., in N.Y.C. By September of 1925 horn assembly work was being done in the U.S. (of English parts). Some minor parts being purchased in the U.S. were introduced to the assembly lines at this time. Major parts such as necks, bells, drivers and bases were shipped from England. Minor parts such as phone cords and rubber bushings were made in the U.S.

By December of 1926 a demand for a deluxe cabinet model in the U.S. caused Amplion to allow the design and development of a wood cabinet to be made in the U.S. The model was called the AA 18 or "Patrician" model. This table cabinet model had carved designs on all four sides of the cabinet and was aesthetically very pretty.



AR 19 (Note wood separators between petals)

By 1926 an announcement by Amplion said some 617,000 horns had been sold in Great Britain alone. (This put the volume of sales up with Atwater Kent and Magnavox horn speakers at that time). When cone speaker sales caught up with horns in mid 1926, Amplion developed and marketed cone speakers also. By 1927 some horn speaker companies in the U. S. were going out of business and others became bankrupt. ACA carried on into 1928 with a strong advertisement campaign. However, they too, in 1928 went out of business. A *Radio Retailing and Jobber* magazine of September 1928, announced that ACA was offering 20 cents on the dollar to creditors.

Many Amplion models were made and sold only in England. The horn models known to have been sold in the U. S. were: AR 15, 19, 39, 45, 61, 102, 111, 114, and AA 18. (The AA 18 was made exclusively for the American market.) A chart lists English and U.S.-produced models. The search was made from available British and American magazine ads.

Some models like the AR 19, which is the most sought after model by U. S. collectors, changed from a round metal driver (slide-in unit) to a square bakelite (quick-thread unit) without any change of model number. Several different petal (wood bell) abutment configurations were made. Some petals merely butted up against the next petal in a flush manner. Some petals had small "H" shaped metal separators between the petals and other bell designs had wood "H" shaped petal separators.

AMPLION RADIO HORN SPEAKERS

(1) (2) AR Model	Year	Style or Name	Description
1/3	?	Wall or table	Adj. swivel base, straight trumpet
5/7	23	Universal	180° adj. swivel, straight trumpet for wall or table
9	28	Swan neck	Bakelite base (last external horn model)
13/15	23	Swan neck, Music Master or Beauty	Small metal three legged base
17/19	23	Dragon	Oak or Mah. petal horn flare (15" flare)
23	25	"Concert" Dragon	Oak or Mah. petal horn flare (21" flare)
27	25	"Concert" Grand	About 27" flare
38	26	Junior Swan neck	Pressed metal base
39	23	—	Small horizontal trumpet
41/43	23	Jr. De Luxe	Straight trumpet
45	23	Jr. De Luxe	Straight trumpet (sold in U.S.)
49		Leviathon	—
58		Senior Swan neck	Same as AR-88 but has cir. metal flare.
60/61	23	Portable	In box with collapsible stand
65	26	New Sr. Dragon	Sq. bakelite unit (driver)
88	?	Swan neck De Luxe	Metal flare, tripod base also wooden petal flare
101/102	24	Baby Amplion, Dragonfly	—
110/111	24	New Jr.	10" metal flare
113/114	24	New Jr. De Luxe	Wooden petal flare
AA 18	26	Patrician	Large table model cabinet (9 x 12 x 18 inches) - sold only in U.S.

Note:

(1) When two numbers appear in the model column, the first number is a 120 ohm winding, and the second number is a 2,000 ohm winding.

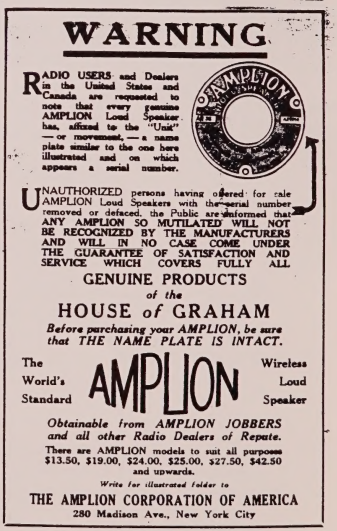
(2) In addition to the above listed models there were two others of which the authors are aware, a 14" all-metal table model and a 23" 'Concert Grand' model with a petalled oak flare. Both were being advertised early in 1923.

AA 18 "Patrician," designed and made in America

One bell, designed for the AR 19, was not wood. It was a one piece cellular rubber bell made by the Miller Rubber Co. of Akron. Some wood petals were made of oak wood and more commonly the wood petals were made of mahogany. Thus, collectors will find a number of variations in the AR 19 horn.

Counterfeiting is considered by some to be the best form of flattery. Amplion had its "flattery" period because an April 1925 magazine ad had a warning from Amplion. (See warning ad.)

From 1923 into 1928 Amplion had a successful sales period in the U. S. The author estimates some 150,000 Amplion horns were sold in the U. S.



WARNING

RADIO USERS and Dealers in the United States and Canada are requested to note that every genuine AMPLION Loud Speaker has, affixed to the "Unit" — or movement, — a name plate similar to the one here illustrated and on which appears a serial number.

UNAUTHORIZED persons having offered for sale AMPLION Loud Speakers with the serial number removed or defaced, the Public are informed that ANY AMPLION SO MUTILATED WILL NOT BE RECOGNIZED BY THE MANUFACTURERS AND WILL IN NO CASE COME UNDER THE GUARANTEE OF SATISFACTION AND SERVICE WHICH COVERS FULLY ALL

GENUINE PRODUCTS
of the
HOUSE *of* GRAHAM

Before purchasing your AMPLION, be sure that THE NAME PLATE IS INTACT.

The World's Standard **AMPLION** Wireless Loud Speaker

Obtainable from AMPLION JOBBERS and all other Radio Dealers of Repute.

There are AMPLION models to suit all purposes $13.50, $19.00, $24.00, $25.00, $27.50, $42.50 and upwards.

Write for illustrated folder to

THE AMPLION CORPORATION OF AMERICA
280 Madison Ave., New York City

ECHOPHONE (UFONIC)

By Floyd Paul

In my book "*Los Angeles Radio Manufacturing*," I had some references to Echophone and the radio sets they made. The origin of Echophone and Ufonic names is further described here.

A 1930 Los Angeles Directory lists a "EUPHONIC RADIO CO. LTD.," at 968 No. Formosa Ave., Hollywood, California. An Echophone model "C" instruction book states, "Mfg. by Ufonic Radio Corp. Ltd." (same address). Early Echophone and Ufonic radios had 3-201A, a 27, a 71A, and an 80 tubes. Some early Echophone sets had an Echophone name on the front of the cabinet and Ufonic on the rear. One collector has an Ufonic radio which was an Echophone S-3 in a different cabinet. One suggestion has been made that Ufonic was a marketing arm of the Echophone company.

The author suggests: Euphonic (dictionary definition- "pleasing or sweet sound") was at one time the original name taken out by the Echophone Co. Euphonic would easily be taken as Ufonic by phonetics. (Besides it is shorter). The shorter name caught on and was used as a radio set name as well as model. Members having knowledge and information about early Echophone or Ufonic sets, please note the request for information announcement in this issue and contact either Richard Gray or me.

ATTENTION: OWNERS OF EARLY ECHOPHONE AND UFONIC SETS

Richard Gray, 9181 Chesapeake Dr., San Diego, CA. 92123, (619) 560-4162, has been fascinated with the early history of Echophone sets. He has a Ufonic set (Echophone) of vintage 1929. He would like other club members with very early Ufonic or Echophone sets to contact him. He would like to obtain serial numbers and data from the sets you have. Call or write either Richard or editor Floyd Paul (818) 242-8961 and let us know which early sets you have.

MINUTES

August 18 Meeting

The meeting was in Torrance. Both swap and luncheon/business meeting were well attended. Pres. Strozier called the meeting to order at 11 AM. Treasurer Murrel Crump reported the club finances were in good shape. Dan Mason, who is replacing our membership secretary Mary Ireland, reported that the membership currently is about 774. He also presented a list of 66 new applicants for SCARS membership. These applicants were voted in.

Ed Sheldon, representing Alan Smith, described the efforts Alan has been making to find a place in San Diego for a "mini" meeting. A likely time is in March 1991. A show of hands of about half the present members would attend such a meeting. Contest chair person Bob Zelenack reported on the contest results and passed out ribbons to the winners.

Program chairman Morgan McMahon reported that he had a cancellation from his program speaker. Morgan then gave a most interesting talk on transistors and transistor radios.

Meeting adjourned at 12:45 PM.

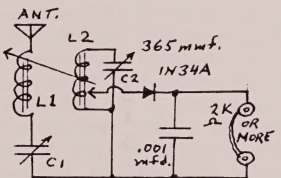
Ed Sheldon, Secretary

A CRYSTAL SET

by Chuck Strozier

With the help of a fellow SCARS member, Arlo Myers, I put together a homebrew crystal set that will receive thirty-five stations minimum, half being DX stations on any given evening under any conditions. (A DX station is defined as one over 300 miles distant.) The set is so selective one must keep a log of the two dial settings involved in tuning, to find a specific station again. During cold winter nights especially after the passage of a storm as many as sixty five stations can be logged in two evenings.

I have constructed just about all of the crystal sets found in publications and in articles from other radio club members. Some of these sets are very good (up to 18 stations, but typically 13) but are typically overrated.



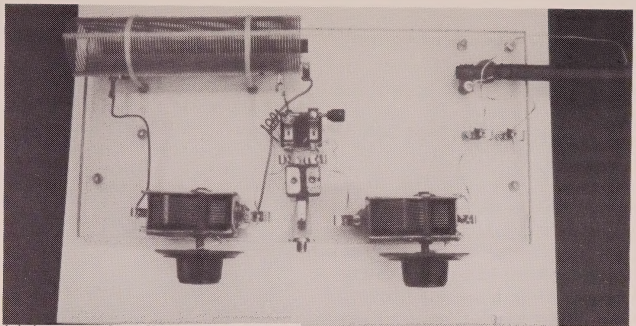
See text for L1 and L2

There are two tuned circuits. One is series-resonant consisting of C1 & L1. C1 is a 365 pf variable capacitor and L1 is a ferrite-core inductor to be described below. It is loose-coupled to parallel-tuned circuit C2-L2, in which C2 is also a 365 pf variable capacitor and L2 is an inductance using special detector taps. This is a fairly straight forward two-circuit tuner of the type popular in the early wireless days before WWI. The difference is in the use of ferrite-core inductances, a modern germanium crystal diode detector, and most especially in careful attention to the coupling between L2 and the detector circuit, so as to minimize detector loading on the C2-L2 tuned circuit. This latter feature provides excellent (and variable) selectivity, while still producing good signal levels from weak stations.

L1 and L2 can use large ferrite cores of the type found in high-quality transistor broadcast radios, but the ones used here (and recommended to those wishing to duplicate my set's performance) are Amidon ferrite rods #R61-050-750, available from Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607, and from Antique Electronic Supply, 688 W. First St., Tempe, AZ 85281. These are 1/2" by 7" rods of ferrite mix #61, which gives a permeability of 125 and very high "Q" in the standard broadcast band. Coil L1 is 85 tyurns of #22 plastic-insulated copper wire wound close-spaced directly on the ferrite rod and approximately centered on the length of the rod.

Coil L2 could also be wound directly on its ferrite rod, but I used a length of Barker and Williamson air dielectric, space wound coil stock. (Write the author or call him for details). The ferrite rod is centered inside the coil by insulated supports. This makes a high quality inductance and one that was especially convenient for experimenting with different detector taps on the coil.

Attention to the detector tap positions and initial hookup plays an extremely important part in selectivity, with very little degradation in



sensitivity, and allows optimum coupling between L1 and L2 to further enhance selectivity. To reduce detector loading on tuned circuit C2-L2, the diode tap should be somewhere between 5 and 10 turns from the ground end of L2 — definitely not across the entire coil. (Connecting the diode to the 10th turn rather than to the "top" end of L2 can increase the selectivity of C2-L2 by more than 30 times with little loss of signal output from the detector.) This allows L1 and L2 to be separated some 12 inches center-to-center (with the rods end-to-end in line) for optimum coupling. Coupling much closer than this degrades selectivity with little gain in signal level.

Most any modern germanium diode is suitable for the detector, for example the 1N34A. There are significant differences in forward resistance, which only means that a slightly different tap point on L2 (one turn, plus or minus) may be needed to make the performance of one type match that of another.

This set was built on a piece of Lexan as a low loss material in a bread board fashion. It could be built in a box as well. The Air Dux coil form would make a smaller set. Numbered knobs, for example 0-100, can be used to relocate dial settings easily.

In order for any crystal set to perform to the maximum a good antenna must be used. It would be wise to put it up before building the set. I can assure you that a small length of wire strung around the room will be a waste of time. A proper antenna will be 100 to 150 feet long including lead in wire. In my opinion it is worth going to any length to get up a good antenna. In my neighborhood a long wire is not permitted so I resorted to suspending a 150 foot wire with a five foot helium balloon. On windy nights a good kite works as well. There are no power lines in my neighborhood, so the balloon or kite works well.

The set needs a good ground. Connection to a metal cold water pipe is usually a good one (though some modern houses don't have a metallic pipe run all the way to the mains). A ground rod or rods driven to a depth of 8 feet or more works well in most soils also. In sandy or rocky soil I've had good results with a counterpoise-type ground system consisting of a 150 ft. length of wire suspended up to ten feet above the surface of the earth. (Connect one end of the wire to the ground post of your set.)

Don't overcouple L1 and L2. This reduces selectivity with little gain in signal strength. You may be amazed at how far L1 and L2 can be separated before a significant reduction in signal strength occurs. Use the least coupling that results in satisfactory signal levels.

Remember that a crystal set supplies no energy of its own to received signals. All the sound energy reaching your ears must come from that small fraction of the distant transmitter's radiated power that is intercepted by our receiving antenna. Under ideal conditions, the human ear can detect sound when a headphone is delivering acoustic power of less than one percent of one millionth of a microwatt. But remember also that hearing really weak signals requires good ears and a quiet environment. Don't try it while sitting next to a noisy air conditioner, or while munching popcorn.

This should be enough information for most folks interested in putting this set together. Call or write me if you want further information.

BOOK REVIEW

By F.A. Paul

"Fixing Up Nice Old Radios," by Ed Romney. A 186 page, paper bound book, available from Romney Publishing, Box 96, Emienton, PA 16373. The cost is $25 plus an additional $1.50 for shipping. Books can be ordered at (412) 867-0414 with a Visa or MasterCard number given.

This book seems to be a well written "hands on" text. The seventeen chapters cover a wide variety of topics that will appeal to beginners as well as more experienced repair people. The first half of the book lays the background for beginners with no high-power theory but, rather, lay persons level text. The book is more than adequately illustrated, with schematics, photos and artwork. Top, bottom, and front views of some selected sets are provided. Named radios such as Scott, Atwater Kent, Zenith, and Philco, among others, are used in the text. Battery sets, cathedrals and consoles are covered in detail. Most radios chosen to be illustrated and discussed in the book are popular sets, not unusual and one-of-a-kind sets. The final chapter about cosmetic restoration and final remarks is particularly useful to the person wanting to fix up old radios.

Ed Romney's background and training make him a natural to write this kind of text. In addition to radar repair work, an FCC Telephone license, a ham license, a bachelors and masters degree, Ed worked for International Correspondence Schools where he created lesson and training instruction material. For the last twenty years he has worked as a dealer and publisher, offering textbooks and supplies for repairing cameras and antique cars.

If you want a book showing you how to fix up old radios, you will not be disappointed in getting this book. Whether it's crystal sets or Scott FM-AM sets, the book covers a great deal of ground — the '20's, '30's, and '40's.

CONTEST ACTIVITY

No Contest in November.

Save your show and tell items for the February meeting, most likely to he held in Torrance.

SCARS ANNUAL MEET
Saddleback Inn
12500 E. Firestone Blvd.
Norwalk, Calif. 90650

Friday, Nov. 16

Noon-5PM	Registration and Flea market
6 PM	Dinner in Cabrillo Room
6:45 PM	Bob Baumbach will speak on the beginnings of the radio/phonograph era
7:30 PM	Chuck Strozier, Lowell Beezley, and Bill Wysock will discuss Tesla Coils. Demonstration to follow plus surprises.

Saturday, Nov. 17

7-11 AM	Registration and flea meet.
10 AM	Check-in for Mini-Auction Items
11 AM	Business Mtg., annual awards, & elections
11:45AM	Lunch in Cabrillo Room
12:45PM	Walt Curry talk.-Transistor Radios-
1:45 PM	Mini Auction Results
2 PM	Adjourn

Things to know.

1. There will be a registration fee of $3.00 for all attendees. (Same as last year)
2. Friday Dinner is $12 and Sat. lunch is $8 per person. Nov. 9 due date. Mail ASAP to Murrel Crump, 1633 Buena Vista Dr., Palm Springs, CA. 92262
3. Rooms- SCARS has a room rate of $45. (two people, one bed). Call (213) 868-0401 to make reservations. Nov. 9th is deadline. Price increases after that date. Act-now.

(1) (2)

Last Gazette ~~Last Gazette~~ Last Gazette

*** * LAST GAZETTE * ***

RENEW NOW FOR NEXT YEARS MEMBERSHIP. SEND $10.00 FOR MEMBER OR $11.00 FOR MEMBER AND SPOUSE.

Send $10 or $11 to:
Dan Mason
1325 N. Lima
Burbank, CA. 91505

(3)

For Sale or Trade & Want Ads

ADS MUST BE SUBMITTED EACH TIME FOR EACH PUBLICATION AND ARE FOR PERSONAL USE ONLY. SCARS WILL NOT PRINT REPETITIOUS ADS. ALL ADS ARE SUBJECT TO EDITING. SCARS IS NOT RESPONSIBLE FOR ANY TRANSACTION OR THE CONDITION OF ITEMS ADVERTISED.

Sale or Trade: 1938 blue mirrored Troy table radio for two mint catalins. Restored 1949 Coke Cooler for mint catalin or Hoppy radios. 1939 Wilcox-Gay Thin Man radio for mint catalin. Tony D'Agostino, (714) 585-6953. Box 741, Big Bear Lake, Ca. 92314

Want: Garod V, Gilfillan GN-2, and AK 50 rcvrs. Need Dubilier "Duration" RF xformer 225-550 meters, W. E. tubes 2-205D or E, 2-231, 2-264A., Stylus for Dumont disc reproducer, Crosley Audio xformer 51 (open windings OK). Sale: Battery cable for Radiola 28, Haynes Griffin IF xformer, 2-RCA 1949 ion gauge tubes for use in high vacuum systems. What solvent can be used to separate tube base from glass envelope? Tad Drogoski, 507 Coal Valley Rd., Jefferson Bow, PA. 15025

Sale: RCA SSB-1, Mark-1 SSB Radiomarine Transmitter-Rcvr. with manual, $100. John Crowe, W6ULZ, 22060 Independencia St., Woodland Hills, CA. 91364. (818) 347-3058.

Want: To correspond with serious Weston Meter and lamp bulb collectors. John W. Weyer, RR Box 175C, Sperry, Iowa, 52650. (319) 985-2405.

Sale: 1928 Majestic 70 console. Beautifully redone inside and out. Have copies of the schematics and owners manual. $550. Pick-up only. Robert Schrantz (818) 962-5796.

Sale: 1947 RCA 20" projection TV. (648 PTK). Doesn't work. Make offer. Tom Merkle, 16120 Acre St., Sepulveda, CA. 91343. (818) 893-4700.

Sale: Radio tubes, 38 in all. Some new in Box., $2.00 to $12.00. Triplet Professional all wave, all purpose tester, model 1175-B, $25., Radio Amateur Handbooks, 1929 $20. and 1947 $10. Tube manuals, data and charts from 40's and 50's $15. Les Steinwehr, 2204 Graydon Av., Monrovia, CA. 91016. (818) 358-8872.

Want: RCA rcvr. CR-88B in any condition. Also RCA AR-88 or CR-91 original cabinet or parts set. Sam, W6HDU, Box 101, Alameda, CA 94501. (415) 521-1429

Want: To buy or borrow for writing and research work selected issues of Radio Retailing, Radio, and Radio Journal magazines. Floyd Paul, (818) 242 8961.

Want: Information on the Hickok OS-10 Signal Generator. Advertising material, dates, instruction book , etc. would be helpful. Copies OK. Ed Sheldon, 656 Gravilla Place, La Jolla, CA. 92037, (619) 456-0506.

Sale: *Communications Equipment of the German Army: 1933-1945*, by Charles J. Barger, 179 pps. This is a new book and it's all in English. $24. ppd. I need 5 W. E. 231D tubes for a set. Will pay $40 each for good filaments or $10 for duds. Bruce Stark, 14841 Archwood St., Van Nuys, CA. 91405. (818) 988-5478.

SALE: Rare Farnsworth Image Dissector TV camera tube (1940), XA-361, with 11-stage electron amplifier. Original factory engineering specs included. Best offer over $2000. F.A. Everest. 2661 Tallant Road. #619. Santa Barbara, CA 93105.

TRADE: Mail order (?) radio school student-built radio. Works good. Looks like a breadboard, circa 1949. Dial glass states "National Schools, Los Angeles, Calif., U.S.A." Trade for best Zenith or Crosley offered, wood or plastic. Also have Arborphone 45 set for trade. Lots of Philco TV service literature, 1950-1960's. Trade for??? Bill Timoszyk. 35283 Leon. Livonia, MI 48150. (313) 421-2076.

WANT: Transistor radios from U.S. or Japan, working or not. Eric Wrobbel. 20802 Exhibit Court. Woodland Hills, CA 91367. (818) 884-2282.

WANT: Old televisions: 7" RCA (621TS), National, DuMont, and others. Sam Thompson, W6HDU. 1031 San Antonio Ave. Alameda, CA 94501. (415) 521-1429.

(Elgin Cont.)

A Radiola X complete and original with four good WD-11's for $65. I could hardly wait to get it out of the shop and test the filaments.

The best deal I heard about went to a fellow at Elgin who entered a swirly red catalin Garod reportedly worth $2,000 in the contest. He had advertized in a local paper for radios and got a call from a guy with several "art-deco" plastics. Going to his house, the Garod was seen sitting in the midst of a bunch of $5 clock radios. The seller allowed as how he knew "arty-deco" radios were worth more than clock radios so he wouldn't take less than $20 for it.

(Cont. CR-13)

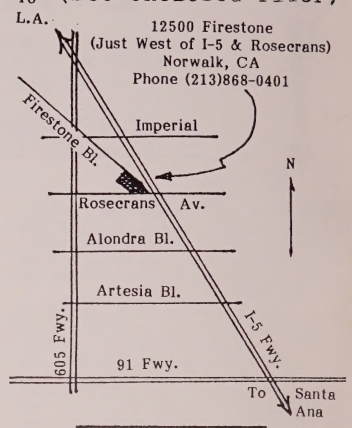
Schnell, at 1MO, and John Reinartz, at 1XAM, obtained permission to operate also on 100 meters. On the night of November 27, 1923, Deloy informed his friends by amateur radio that he was copying their signals one foot from his headphones. The CR-13 was performing spectacularly, as Grebe had promised it would, on this momentous occasion in the history of amateur radio.

1. Henny, K. (1925). What do we know about short waves? Radio Broadcast, 8, 54-55.
2. *Fifty Years of A.R.R.L.* (1965). Newington: American Radio Relay League, p. 45.

NOVEMBER PROGRAM

Walt Curry will present an historical perspective on transistor radios at the November meeting. It will be hardware oriented. Examples of early sets, including hybrids, solar-powered, and novelty sets will be shown and discussed. Collecting and repairing will also be covered.

NOV. 16 & 17 MEETING
SADDLEBACK INN
(See enclosed flier)



CONTEST RESULTS
August Meeting

Crystal sets:
Rooca set, Lee Johnson 1st
Monarch set, Carl Bier 2nd
World set, Lee Johnson 3rd

One and two tube sets:
Clapp-Eastham, Lee Johnson 1st
Crosley Pup, Kenneth Acord 2nd

Amateur and Early Communication Receivers
Breting 12, Tony Handler 1st
Patterson 12, Tony Handler 2nd
Patterson 10, Tony Handler 3rd

Judges: Arlo Myers, Walt Curry, Jay McAlister

GAZETTE DEADLINES

All ads, material and articles for SCARS *Gazette*:

February issue . . . . .December 1
May issue . . . . . March 1
August issue . . . . . .June 1
November issue . . . .September 1